# ASSIGNMENT 4

Textbook Assignment: Unit 4, Lesson 1, "FLENUMOCEANCEN'S Analysis Models." Pages 4-1-5 through 4-1-8.
Unit 4, Lesson 2, "Fleet Numerical Oceanography Center Meteorological and Oceanographic Products." Pages 4-2-1 through 4-2-16.
Unit 4, Lesson 3, "National Weather Service Charts and Products." Page 4-3-1 through 4-3-41.

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Learning Objective:
Recognize the most common charts produced using the scale and separation model, and the major problem with the model.

4-1. Which of the following charts is/are produced using the scale and separation model?

1. 500-mb shortwave (SD)
2. 500-mb longwave (SL)
3. 500-mb residual (SR) and planetary vortex (SV)
4. All of the above produced

4-2. What is the major problem with the scale and separation model?

1. In summer, long waves appear weaker and short waves appear stronger than they actually are, and the situation is reversed in winter
2. In summer, short waves appear weaker and long waves appear stronger than they actually are, and the situation is reversed in winter
3. The planetary vortex field is overly smoothed
4. The model assumes the atmosphere is fluid and moves in wave-like patterns

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Learning Objective:
Recognize the parameter used in FLENUMOCEANCEN'S atmospheric frontal model, and the strengths and weaknesses of the final product.

4-3. What is the only parameter used by the FLENUMOCEANCEN'S Frontal Analysis (GGθ) model to "place" a front?

1. Surface air temperature
2. Wind shear
3. Occurrence of weather
4. 1,000 mb to 700 mb mean-potential temperature

4-4. Which of the following are weaknesses of the GGθ model?

1. It is not very accurate and can not "pin point" a front
2. It handles fast moving cold fronts and occluded fronts poorly
3. It produces false frontal indications in areas of fast forming inversions and in the vicinity of mountains
4. All of the above

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Learning Objective:
Recognize how FLENUMOCEANCEN'S models derive the heights of the tropopause and the freezing level.

4-5. How is the height of the tropopause determined by FLENUNOCEANCEN's computer?

1. Raw reported data is searched to locate the tropopause heights, then the data is analyzed on a grid
2. Thermal lapse rates are extrapolated between the mandatory 500-mb level and mandatory 400-mb level to find the base of the isothermal level
3. Calculations based on the 1,000-mb to 500-mb thickness and the height and temperature of the 400-mb level are used to locate the base of the isothermal layer
4. Calculations based on observed jet-stream-cirrus-cloud-top temperatures and the reported mandatory-level heights and temperatures establish the height of the tropopause

4-6. What does the computer-derived tropopause height actually represent?

1. The point where the lapse rate changes from negative (in the troposphere) to isothermal (in the tropopause)
2. The point where the temperature gradient changes from isothermal (in the tropopause) to positive (in the stratosphere)
3. A point generally near the mid-section of the more-or-less isothermal tropopause layer
4. The statistical level of maximum winds 3,000 ft below the base of the tropopause

4-7. How does the FLENUMOCENCEN computer locate the freezing level?

1. All reported freezing levels (RADAT Data) are gridded and analyzed
2. Upper air mandatory level data is interpolated to find a freezing level
3. Upper air significant and mandatory level data is interpolated to find the freezing level

4-8. When is the freezing level data LEAST reliable?

1. Only when inversions are present
2. Only when multiple freezing levels are present
3. When either inversions or multiple freezing levels are present
4. Whenever the surface air temperature is less than 32°F.

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Learning Objective: Identify FLENUMOCEANCEN's oceanographic analysis models and their uses.

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4-9. What is the greatest depth that EOTS uses actual reported temperature data?

1. 400 meters
2. 750 meters
3. 1,500 meters
4. The ocean bottom

4-10. EOTS is the primary input model for FLENUMOCEANCEN'S layer depth analyses and acoustic predictions.

1. True
2. False

4-11. What model provides a mechanism for heat and energy exchange from the atmosphere to the oceans?

1. EOTS
2. TEOTS
3. TOPS
4. FIB

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Learning Objective:
Identify the primary elements used by the Ocean Frontal model.

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4-12. What is the primary element used by the ocean frontal model to evaluate differences in water masses?

1. Salinity
2. Water temperature
3. Biological population
4. Water color

4-13. Which of the following analyses provides the more reliable and accurate ocean frontal analysis?

1. The computer analysis based on the SST field
2. The computer analysis based on the sub-surface temperature field
3. Both are equally reliable

4-14. Which model is routinely used to analyze wave heights, directions, and periods for the majority of the ocean areas?

1. TEOTS
2. NORAPS
3. SWOM
4. GSWOM

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Learning Objective:
Interpret various surface weather charts produced by FLENUMOCEANCEN.

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**A. ISOBARS**
**B. ISOTHERMS**
**C. FRONTS**
**D. PRESSURE CENTERS**
**E. SURFACE WIND SPEED AND DIRECTION**

**FIGURE 4A**

REFER TO FIGURE 4A TO ANSWER QUESTION 4-15.

4-15. Which of the following parameters are depicted on an FLENUMOCEANCEN Preliminary Surface Analysis chart?

1. A, B, C, D, and E
2. Only A, C, D, and E
3. Only A, D, and E
4. Only A and D

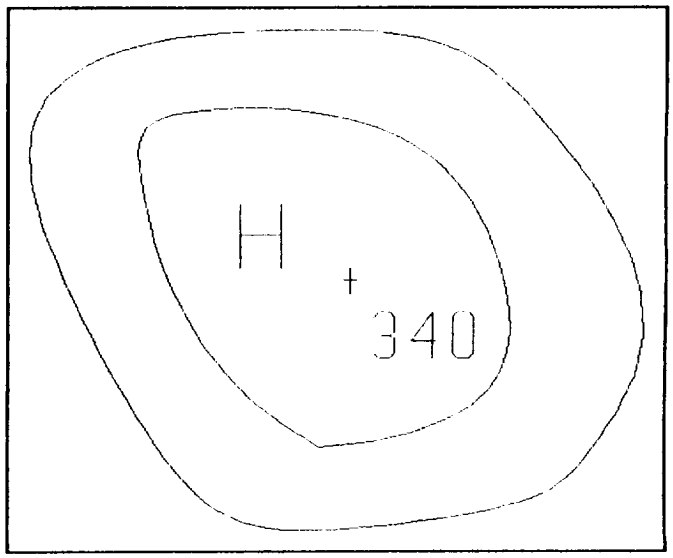


**FIGURE 4B**

REFER TO FIGURE 4B, A SECTION OF A PRELIMINARY SURFACE PRESSURE ANALYSIS CHART, FOR QUESTIONS 4-16 AND 4-17.

4-16. What does the “+” sign represent?

1. The central pressure is higher than the last drawn isobar
2. The central pressure is higher than the 1,000 hPa standard
3. The position of the highest surface pressure
4. The pressure is an extrapolated value, not based on an actual reported pressure

4-17. The "340" indicates the central pressure is how many hectopascals?

1. 340
2. 1,003.40
3. 1,034.0
4. 3,400

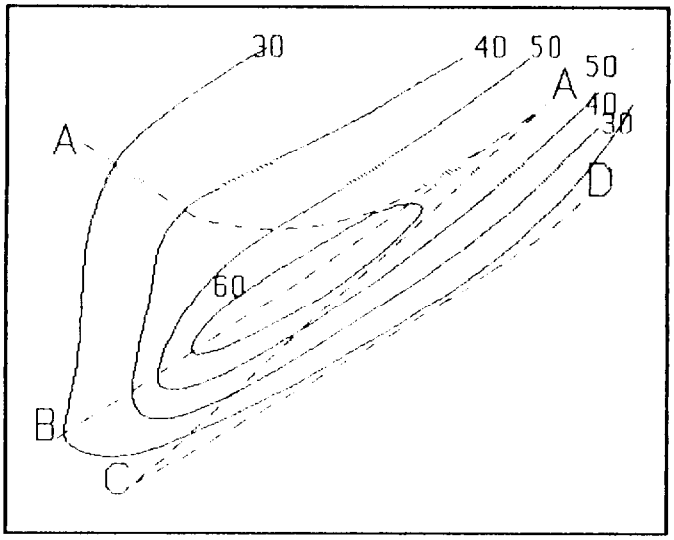


**FIGURE 4C**

REFER TO FIGURE 4C, A SECTION OF A GOES CHART, FOR QUESTIONS 4-18 AND 4-19.

4-18. Which line should be drawn to indicate the best placement of a frontal system based on the computer's selection of the location?

1. AA
2. BA
3. CA
4. DD

4-19. What does the isoline labeled "60" represent?

1. A 60 percent probability of a frontal boundary based on mean potential temperature
2. The mean potential temperature is 60°C
3. The difference in calculated mean potential temperature from a standard is 60°C
4. 60 percent of the weather associated with this front is enclosed by the line

**A. PRESSURE CENTERS**
**B. ISOBARS**
**C. ISOTHERMS**
**D. 12 HOUR PRESSURE CHANGE**
**E. FRONTS**
**F. SURFACE WIND SPEED AND DIRECTION**

**FIGURE 4D**

REFER TO FIGURE 4D TO ANSWER QUESTION 4-20.

4-20. Which of the information in figure 4D is depicted on a FLENUMOCEANCEN Surface Wind and Pressure Prognosis chart?

1. A, B, C, D, E, and F
2. Only A, B, C, E, and F
3. Only A, B, and F
4. Only B and F

**A. HEIGHT CENTERS**
**B. ISOHEIGHTS**
**C. ISOTHERMS**
**D. ISOTACHS**
**E. TROUGHS/RIDGES**
**F. WIND SPEED AND DIRECTION**

**FIGURE 4E**

REFER TO FIGURE 4E TO ANSWER QUESTION 4-21.

4-21. Which of the information in figure 4E is depicted on FLENUMOCEANCEN's Constant Pressure charts?

1. Only A, B, and F
2. Only A, B, C, and F
3. Only A, B, C, D and F
4. A, B, C, D, E, and F

4-22. Which of the following is represented by a dashed line on FLENUMOCEANCEN's Constant Pressure charts?

1. Isoheights
2. Isotherms
3. Isotachs
4. Troughs

4-23. What is the standard isotherm interval on FLENUMOCEANCEN's Constant Pressure charts?

1. 2°C
2. 4°C
3. 5°C
4. 10°C

4-24. On a FLENUMOCEANCEN Freezing Level analysis, a dashed line labeled "10" indicate the freezing level is?

1. 1,000 ft
2. 1,000 meters
3. 10,000 ft
4. 10,000 meters

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Learning Objective: Interpret various oceanographic charts produced by FLENUMOCEANCEN.

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4-25. On a FLENUMOCEANCEN Sea Surface Temperature Anomaly chart, what is indicated by a solid line labeled "2"? Assume that the line forms a closed curve around an area of water.

1. The seawater temperature in the vicinity of the line is 2°C
2. The sea-surface temperature within the area surrounded by the curve is 2°C or more above normal
3. The sea-surface temperature within the area surrounded by the curve is 2°C or more lower than normal
4. The seawater temperature within the area surrounded by the curve is 20°C or more above normal

4-26. What parameter does the Significant Wave Height chart depict?

1. The higher of the average wind wave heights or the average swell wave heights
2. The higher of either the highest 1/3rd of the wind wave heights or the highest 1/3rd of the swell wave heights
3. The highest 1/3rd of the wind wave heights
4. The highest 1/3rd of the swell wave heights

4-27. On a FLENUMOCEANCEN MLD chart, which of the following is the correct depth of the MLD for a point exactly halfway between a contour labeled 140 and a contour labeled 180?

1. 160 meters
2. 1,600 meters
3. 160 ft
4. 1,600 ft

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Learning Objective: Identify the sources used to obtain information about available products and identify request procedures for message format gridded data.

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4-28. Which of the following publications lists FLENUMOCEANCEN meteorological and oceanographic products available in gridded format by message via the Automated Weather Networks Meteorological Environmental Data Service (AWN/MEDS)?

1. AWSP 105-52, Vol III, *Weather Message Catalog*
2. AWSP 105-52, Vol I, *Facsimile Products Catalog*
3. FLENUMOCEANCENINST 3140.3, *Automated Product Request (APR) Users Manual*
4. NAVOCEANCOMINST C3140.22, NAVOCEANCOM *Environmental Tactical Support Products Manual* (U)

4-29. Which of the following sources lists request procedures for FLENUMOCEANCEN data fields and specialized meteorological and oceanographic products available via AUTODIN message and/or NEDS?

1. AWSP 105-52, Vol III, *Weather Message Catalog*
2. AWSP 105-52, Vol I, *Facsimile Products Catalog*
3. FLENUMOCEANCENINST 3140.3, *Automated Product Request (APR) Users Manual*
4. NAVOCEANCOMINST C3140.22, *NAVOCEANCOM Environmental Tactical Support Products Manual* (U)

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Learning Objective:
Identify the acoustic range prediction products available from FLENUMOCEANCEN,identify the manual that describes the request procedures for those products, and identify the manual that describes the product format and provides an interpretation guide.

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4-30. Which of the following sources provides detailed information about ASRAP, SHARPS, and PHITAR products?

1. AWSP 105-52, Vol III, *Weather Message Catalog*
2. AWSP 105-52, Vol I, *Facsimile Products Catalog*
3. FLENUMOCEANCENINST 3140.3, *Automated Product Request (APR) Users Manual*
4. NAVOCEANCOMINST C3140.22, *NAVOCEANCOM Environmental Tactical Support Products Manual* (U)

4-31. Which of the following sources provides guidance on REQUEST PROCEDURES for Active ASRAP, ASRAP, SHARPS, and PHITAR products?

1. AWSP 105-52, Vol III, *Weather Message Catalog*
2. AWSP 105-52, Vol I, *Facsimile Products Catalog*
3. FLENUMOCEANCENINST 3140.3, *Automated Product Request (APR) Users Manual*
4. NAVOCEANCOMINST C3140.22, *NAVOCEANCOM Environmental Tactical Support Products Manual* (U)

4-32. ASRAPC provides expected passive acoustic ranges for different source and receiver depths for each different

1. type of sonar equipment
2. sonar frequency
3. source depth
4. sonobouy type

4-33. ASRAPC, ASRAPR, ASRAPS, and ASRAPV provide how many propagation loss predictions?

1. One
2. Two
3. Three
4. Four

4-34. What type(s) of sonar system does SHARPS support?

1. Active only
2. Passive only
3. Both active and passive

4-35. What product is designed to primarily support submarines?

1. ASRAP
2. Active ASRAP
3. SHARPS
4. PHITAR

Learning Objective: Identify the types of National Weather Service products and the routine methods used to distribute these products to Naval Oceanography Command units and to Fleet Aerographer's Mates.

4-36. The AWN and the AFDIGS are designed to support which of the following organizations?

1. The U.S. Air Force and Air Weather Service activities
2. The U.S. Navy and Naval Oceanography Command activities
3. The U.S. Coast Guard
4. All Department of Defense activities

4-37. When U.S. Naval ships are operating off the coast of foreign countries, which organization is responsible for forwarding the ship's observations to the United States?

1. The U.S. Navy
2. The U.S. Air Force
3. The National Weather Service
4. The World Meteorological Organization

4-38. Which U.S. government agency receives worldwide raw observations and data and forwards this data to the AWN?

1. The Navy's Fleet Numerical Oceanography Center (FNOC)
2. The Air Force's Global Weather Center (GWC)
3. The National Weather Service's National Meteorological Center (NMC)
4. The World Meteorological Organization's Global Data Processing Center

4-39. What type of data does the NMC provide for use by the DOD that is available to U.S. Navy Fleet units via the U.S. Navy Fleet Facsimile Broadcast?

1. Raw meteorological observations
2. Meteorological and oceanographic charts
3. Satellite imagery
4. Processed digital data fields

4-40, What type of product is provided by the National Environmental Satellite Data and Information Service (NESDIS), and is available to all Naval Oceanography Command Centers and most shipboard Aerographers?

1. Satellite imagery
2. Raw meteorological and oceanographic observations
3. Meteorological and oceanographic charts
4. Processed digital data fields

4-41. How do U.S. Naval ships receive most of their observations and terminal area forecasts?

1. Via the Fleet Multi-channel Satellite Broadcast (or Fleet Multi-channel HF Broadcast)
2. Via the AWN's (CONUS, Caribbean, Pacific, European) Meteorological and Environmental Data Service (COMEDS, CARMEDS, PACMEDS, EURMEDS)
3. Via the Fleet Facsimile Broadcast
4. Via direct HF transmission from the source

4-42. How do Naval Oceanography Command Facilities and Detachments in the continental United States receive most of their observations and forecasts?

1. Via the Fleet Multi-channel Satellite Broadcast (or Fleet Multi-channel HF Broadcast)
2. Via the AWN's (CONUS, Caribbean, Pacific, European) Meteorological and Environmental Data Service (COMEDS, CARMEDS, PACMEDS, EURMEDS)
3. Via the Fleet Facsimile Broadcast
4. Via direct HF transmission from the source

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Learning Objective:
Identify the major numerical models used by the National Weather Service.

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4-43. What model calculates atmospheric changes on a grid with a 116-kilometer grid spacing (at 45°N)?

1. LFM II
2. NGM
3. PE
4. Spectral

4-44. What 16-layer model uses three separate grids of varying resolution to increase the accuracy of its calculations?

1. LFM II
2. NGM
3. Spectral
4. Barotropic Mesh

4-45. What is the approximate correct height of the boundary layer in the NGM?

1. 1,000 ft
2. 1,500 ft
3. 2,500 ft
4. 3,500 ft

4-46. Which model is routinely used to calculate atmospheric changes for an entire hemisphere or the entire globe, but, because of the number of calculations involved, is only run out to 60 hours?

1. LFM
2. NGM
3. Spectral
4. 3-Layer Global

4-47. Which model is routinely used to calculate changes in the atmosphere out to 11 days?

1. LFM II
2. NGM
3. Spectral
4. 3-Layer Global

4-48. Which model routinely calculates conditions out to 10 1/2 days, but should only be used for forecasting situations where no temperature advection is occurring?

1. Barotropic Mesh
2. 3-Layer Global
3. NGM
4. Spectral

4-49. Which program forecasts probability of weather occurrence based on the atmospheric parameters from the NGM model?

1. LFM
2. NGM
3. NGM Perfect Prog
4. LFM MOS

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Learning Objective:
Identify parameters on the most frequently used National Weather Service Facsimile charts.

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4-50. What does the Type, Intensity, Character code group 481] mean?

1. A strong cold front, showing no change in intensity, but forming a narrower or smaller area of cloudiness/weather
2. A strong cold front, decreasing in intensity, and showing no change in the frontal weather area
3. A moderate cold front, increasing in intensity and size of the frontal weather area
4. A moderate cold front showing little intensity change but displaying a decrease in size of the frontal weather area

4-51. On a Weather Depiction Analysis, what visibility is indicated by a diagonally hatched (shaded) area?

1. 5+ nmi
2. ≥ 3 nmi, ≤ 5 nmi
3. < 3 nmi
4. < 1/2 nmi

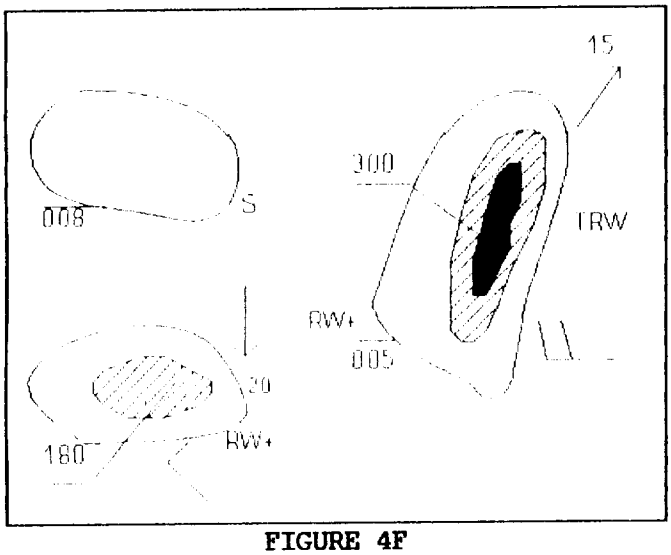


**FIGURE 4F**

REFER TO FIGURE 4F, A SECTION OF A RADAR SUMMARY, TO ANSWER QUESTIONS 4-52 THROUGH 4-54. ASSUME THE TOP OF THE FIGURE REPRESENTS TRUE NORTH.

4-52. What type of Precipitation is indicated in the upper-left quadrant?

1. Snow
2. Snow showers
3. Rain
4. Sleet

4-53. What is the cell movement of the strongest cell depicted?

1. Southeast at 10 kt
2. South at 25 kt
3. East at 20 kt
4. Northeast at 15 kt

4-54. What is the reported height of the highest cloud cell top?

1. 300 ft
2. 3,000 ft
3. 30,000 ft
4. 300,000 ft

4-55. What is the isotherm interval and the isoheight interval on a 300-hPa analysis chart?

1. 5°C / 120 meters
2. 5°C / 60 meters
3. 2°C / 120 meters
4. 2°C / 60 meters

4-56. On an Upper Air Analysis chart, where the temperature is -30°C, what is the greatest dew-point depression that would indicate broken cloud cover?

1. 1°C
2. 3°C
3. 5°C
4. 7°C

4-57. On a Composite Analysis, what interval is used for the freezing level isolines?

1. 1,000 meters
2. 1,000 ft
3. 4,000 meters
4. 4,000 ft

4-58. On a Surface Weather Prognosis chart, what feature does the bold-scalloped line surround?

1. Areas of forecast broken to overcast cloudiness
2. Areas of forecast MVFR cloudiness and risibilities
3. Areas of moderate or greater turbulence
4. Areas of precipitation

4-59. What does an area of Positive Vorticity Advection (PVA) indicate on the NGM 500-hPa Heights/Vorticity Prognosis chart?

1. Existing clouds will thicken
2. Moisture is moving into the area
3. Atmospheric drying will occur
4. Temperatures will increase

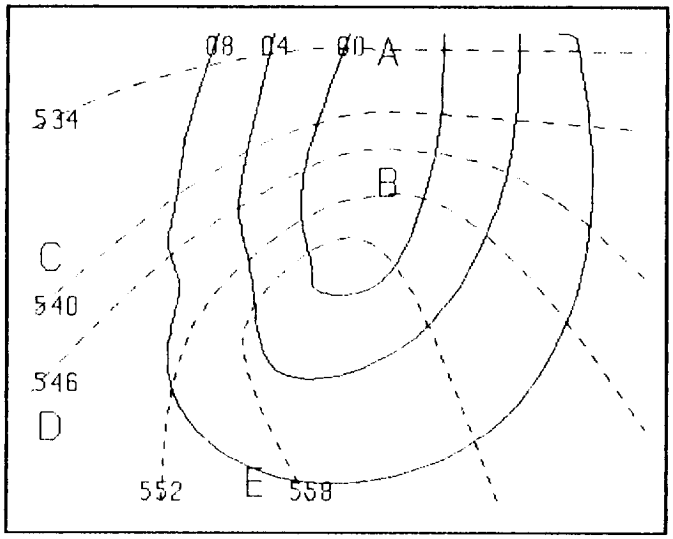


**FIGURE 4G**

REFER TO FIGURE 4G, A SECTION OF AN NGM MSLP/1000 TO 500-HPA THICKNESS PROGNOSIS CHART, TO ANSWER QUESTION 4-60.

4-60. Where should the analyst place the cold front in figure 4G?

1. Through points ABE
2. Through points ABD
3. Through points BD only
4. Through points BC only

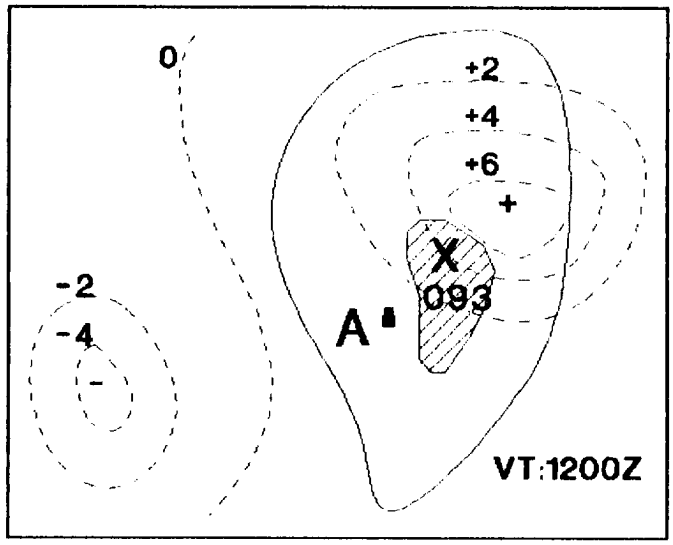


**FIGURE 4H**

REFER TO FIGURE 4H, A SECTION OF AN NGM 700-HPA VERTICAL VELOCITY AND PRECIPITATION PROGNOSIS CHART, TO ANSWER QUESTION 4-61.

4-61. What precipitation is indicated under point A of figure 4H?

1. 1/2 in/hr at 1200Z
2. 1/2 inch total during the period 1200Z through 0000Z
3. 1/2 inch total during the period 0600Z through 1200Z
4. 1/2 inch total during the period 0000Z through 1200Z

4-62. On the MOS Probability of Precipitation (POP) and Precipitation Type Prognosis chart, what type of precipitation is indicated by the symbol " • "?

1. Light intermittent rain
2. Light continuous rain
3. Moderate intermittent rain
4. Freezing rain

4-63. What is the forecast period covered by the Mid-Range Surface Prognosis chart?

1. Forecasts out to 48 hours (2 days) only
2. Forecasts for days 3 to 5 only
3. Forecasts for days 3 to 10
4. Forecasts for days 6 to 10 only

4-64. Your station's monthly mean maximum temperature is 78°F, and the monthly mean minimum temperature is 59°F. When the Minimum Temperature Anomaly panel for day 5 (from a Mid-range Temperature Anomaly chart) shows a +4 isoline directly over your station, what temperature is indicated for your station on day 5?

1. Minimum temperature will be 63°F
2. Maximum temperature will be 82°F
3. Minimum temperature will be 55°F
4. Maximum temperature will be 74°F

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Learning Objective: Interpret commonly used National Weather Service bulletins.

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REFER TO TABLE 4-3-5 IN THE TRAMAN TO ANSWER QUESTIONS 4-65 THROUGH 4-68.

4-65. What is the valid time of the last line of data in table 4-3-5?

1. 12002 04 December 1989
2. 12002 05 December 1989
3. 12002 06 December 1989
4. 00002 06 December 1989

4-66. In the last line of data, what sea level pressure is forecast?

1. 1,000.4 hPa (rob)
2. 1,004.0 hpa (rob)
3. 1,040.0 hPa (rob)
4. 996.0 hPa (rob)

4-67. What wind speed is indicated in the last line of the bulletin?

1. 18 kt at the surface
2. 18 kt at 1,000 ft
3. 18 kt at 1,400 ft
4. 18 kt at 2,500 ft

4-68. What information does the column labeled "PTT" provide?

1. Accumulated precipitation for the 6 hour period ending at the valid time
2. Accumulated precipitation for the 12 hour period ending at the valid time
3. Accumulated precipitation for the 6 hour period beginning at the valid time
4. Accumulated precipitation for the 12 hour period beginning at the valid time

REFER TO TABLE 4-3-7 IN THE TRAMAN FOR QUESTIONS 4-69 AND 4-70.

4-69. In the last line of the NGM forecast for Washington, D.C., what does the "HH" value 45 mean?

1. The boundary layer is 45 meters above the surface
2. The boundary layer is 45 hPa above the surface
3. The 1,000- to 500-hPa thickness is 450 decimeters
4. The 1,000- to 500-hPa thickness is 545 decameters

4-70. In the last line of the bulletin, the last two digits in the bulletin, "99", means the 7,000 foot temperature is

1. 99°F
2. 99°C
3. 01°c
4. -01°c

REFER TO TABLE 4-3-9 IN THE TRAMAN TO ANSWER QUESTIONS 4-71 THROUGH 4-73.

4-71. In the LFM MOS forecast bulletin shown in table 4-3-9, what is the probability of the station being affected by a thunderstorm during the period 0000Z 06 December to 1200Z 06 December?

1. 1%
2. 6%
3. 10%
4. 60%

4-72. What is the forecast dew-point temperature at 0300Z 05 December?

1. 28°F
2. 29°F
3. 32°F
4. 34°F

4-73. At 1800Z 05 December, what is the probability of having broken cloud cover?

1. 10%
2. 20%
3. 30%
4. 40%

4-74. If the “OBVIS” group of an LFM MOS bulletin reads “23X5/4”, what phenomenon is most likely to occur?

1. No significant weather
2. Haze
3. High winds
4. Fog

REFER TO TABLE 4-3-10 IN THE TRAMAN TO ANSWER QUESTION 4-75.

4-75. Where is the parcel of air that is forecast to be over Miami at the 850-hPa level at 1800Z 03 December located at the analysis time?

1. 24.4°N 081.8°W and higher in the atmosphere
2. 24.4°N 081.8°W and lower in the atmosphere
3. 20.8°N 081.2°W and higher in the atmosphere
4. 20.8°N 081.2°W and lower in the atmosphere